DOCUMENT RESUME

ED 415 985 PS 026 169

AUTHOR Lozano, Patricia; Medearis, Linda
TITLE Matematica Natural.
PUB DATE 1997-04-00
NOTE 9p.; Paper presented at the International Conference and Exhibition of the Association for Childhood Education (Portland, OR, April 9-12, 1997).
PUB TYPE Reports - Descriptive (141) -- Speeches/Meeting Papers (150)
EDRS PRICE EDRS Price MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS *Culturally Relevant Education; Early Childhood Education; Experiential Learning; Hispanic Americans; *Mathematics Activities; *Mathematics Curriculum; Parents as Teachers
IDENTIFIERS *Hands on Experience; *Natural Mathematics; NCTM Curriculum and Evaluation Standards

ABSTRACT

Matematica Natural (Natural Mathematics) is a mathematics curriculum for young children based on the assumption that they learn mathematics through concrete, real life, relevant experiences and that educational differences rather than cultural differences influence math achievement. The curriculum uses hands-on materials and activities to teach mathematics, incorporating parental involvement and learning based on prior experiences. This report describes the Natural Mathematics curriculum and provides examples of early childhood mathematics activities that are culturally and environmentally relevant. Sample activities incorporate: the Hispanic Easter tradition of breaking "cascarones" to learn shapes and measurement; using dance to learn patterns; using yarn activities to teach measurement, counting, and problem-solving; and using books about animals indigenous to the region to integrate Matematica Natural, the National Council of Teachers of Mathematics standards, and literacy activities. The report also discusses the decline in mathematics achievement among Texas-Mexico border schools, the limited mathematics experiences in early childhood education, the need for mathematics concept development prior to school entry, and how home and preschool activities can provide young children with problem-solving opportunities. The paper concludes with a list of books about or for Hispanic children. (KB)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED 415 985

MATEMATICA NATURAL

Dr. Patricia Lozano and Dr. Linda Medearis
Texas A&M International University

Evidence from test scores among border (Texas-Mexico) schools suggests that mathematics is critical to the overall academic success of students. Many Texas schools experience a significant decline of math scores among elementary and secondary students. Texas Education Agency (TEA) reports suggest that low performing schools as a group tend to have higher numbers of students on free or reduced lunch; have higher numbers of minority students; and have lower levels of funding per student. While no causal links can be implied by such results, educators tend to recognize that poorer districts and poorer communities often do not have the resources to prepare students to receive education in the same way that more affluent communities have. More critical perhaps is uncertainty among families about how best to help their children be successful in school mathematics.

A bright spot in early childhood education has been the recent recognition of the positive role of the use of whole language activities to foster reading and language skills. Math for young children has not experienced the same developmental pattern. Consequently, math and problem solving do not have the same status as language interaction with early childhood educators and parents. The result tends to be a school-based approach to mathematics in which children with few math experiences struggle to make meaning from the abstract nature of textbook math. Children with limited prior experiences usually fail to access the necessary components for achievement in math.

Math success is dependent on the development of the linking between relationships and the nomenclature of math in a natural way. Failure to make this connection may result in a lifetime of math failure, math anxiety, or low performance in what should be a natural human process. Minority students typically do poorer in math than do students from Anglo populations. Educational differences, not cultural differences, are the major cause of math failure. Math concept development is critical to and natural for all children regardless of race, culture, and /or level of income. A further important concept is that all parents and family members can be important in the development of skills which can help young children develop as natural mathematicians Charlesworth, 1996).

PS 026169

BEST COPY AVAILABLE

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL IN OTHER THAN PAPER COPY HAS BEEN GRANTED BY
Patricia Lozano
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☐ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

The need to be able to make sense of math begins before school, at home with their first teachers, the parents. Mathematical ideas begin to form early in young children as a natural result of their experiences in the world around them. All children learn through these experiences. Young children interpret new experiences based on prior knowledge. Their prior experiences with "concrete objects and real-world events" assist them in the learning process. Home and preschool activities provide young children with the opportunities to solve problems and make discoveries for themselves (Charlesworth & Lind, 1995).

How children learn will greatly influence what they learn. As an example blocks permit the young children to begin to develop an understanding of shape, size, and symmetry. The use of blocks is an active, hands-on experience. The more concrete and active the experiences that are provided for young children, the greater the opportunities for them to learn. The National Association for the Education of Young Children (NAEYC) recommends that the curriculum of early childhood programs integrate all content area instruction through the use of meaningful activities such as building blocks, sorting objects, singing and dancing to music, exploring animals and plants (Bredekamp & Copple, 1997).

The National Council of Teachers of Mathematics(NCTM) have proposed Standards for teaching mathematics which have been accepted and implemented throughout this country. Following the precepts of these standards, Matemàtica Natural complements the ensuing concepts of hands-on materials and activities, parental involvement, and learning based on prior experiences (Medearis, 1996).

Matemàtica Natural/Natural Mathematics takes real life experiences and teaches mathematics to young children. All the experiences are based on what young children have been exposed to at home and in their environment. **Most of the experiences are culturally and environmentally related.** The following serve as examples of how any teacher of young children can make mathematics culturally and environmentally relevant thereby providing a meaningful learning experience.

The Hispanic culture along the Texas-Mexican border has a tradition at Easter time of

breaking cascarones, egg shells filled with confetti, on a person's head. The cascarones are decorated on the outside with markers, finger paints, crayons, etc. then are filled with confetti. These cascarones are a part of every young child's experiences. The cascarones lend themselves to use in Matemàtica Natural. Young children learn about shapes, the oval shape of the egg. They learn about measurement by exploring how much confetti fills the egg. Youngsters learn about symmetry by examining which end of the egg to break. The list could go on and on.

An Easter dance using music from the region is another appropriate activity for Matemàtica Natural. Young children use colorful streamers to dance to music. They learn about patterns through the dance steps that are invented. Rhythm, beat and tempo as experienced through music and dance have strong mathematical connections. Some appropriate songs for this activity are: La Macarena, La Bamba (modern), Tres Hojitas Verdes, Las Mañanitas, and A la Ruela, Ruela.

Most young children are familiar with yarn. Their grandmothers, aunts, or mothers either knit or crochet. Hispanic parents traditionally tell of the contest between the devil and the tailor. The devil said he could sew faster than the tailor. The tailor used short pieces of thread to sew while the devil used long pieces that got tangled. This old tale offers children insights into comparisons like short and long. Yarn can also be used for counting. Give each child a different length of yarn. Have the child count by running his/her pointer finger and thumb down the length of the yarn. This can be done by counting slowly or rapidly. Children compare their counts. Young children learn to problem solve as they explore why was the count different. They learn to communicate mathematically through explanations of their solutions. Children experience measurement by using yarn to see who is the nosiest, or has the longest nose.

Vegetable gardens are a common enterprise along the border. Many families in the area are economically depressed and the vegetables harvested from these gardens provide much needed staples for meals. A great favorite of these is calabasitas(squash). Thus young children relate to the story Carlos and the Squash Plant by Jan Romero Stevens. Many times parents tell their children to wash behind their ears or wash their "bellybutton." If they do not wash, a plant will grow. Young children learn reasoning skills as they consider why the squash plant begins to grow

in young Carlos' ear. They further experience patterns as, in the story, every day Carlos uses a bigger hat. Comparisons occur as the vine is observed growing daily as it emerges from Carlos' ear.

The use of animals indigenous to the region are very helpful in teaching Matemàtica Natural. The coyote, cuervo (black bird), vibora (snake), ratoncito (little mouse), el paisano (roadrunner), and tecolote (owl) are animals with which most children in South Texas are familiar. Reading stories about these animals, like Little Owl, to young children provides the integration of Matemàtica Natural, the NCTM standards and literacy. Little Owl is a simple folding book involving spatial concepts such as inside, outside and upside down. Other stories currently available have both the English and Spanish translations. The following stories are culturally and environmentally relevant to the population of young children along the border in south Texas . Coyote by Gerald McDermott provides richly colorful patterns typical of the Southwest which youngsters can explore through examining shapes, repetitions and comparisons. Alejandro's Gift by Richard E. Albert offers an opportunity for children to consider the importance of distance and space as Alejandro tries to offer much needed water to the various animals of the southwest. Siete Ratones Ciegos by Ed Young is a Spanish translation of an old tale about using the senses other than sight to identify an "elephant." As the blind mice perceive a different image from their exploration of the elephant, youngsters can begin to understand problem solving through reasoning using factors such as length, size and shape.

Incorporating the NCTM standards through Matemàtica Natural aids in ensuring that young children are learning mathematics through the use of concrete, real life and relevant experiences. Matemàtica Natural assumes that culture does not play a part in achievement and that such assumptions are contrary to the view that children with the opportunity and encouragement to learn can do so regardless of culture, race, or level of income. The project is based on the concept that educational differences, not cultural differences, are the major cause of math failure. Also the project considers that math concept development is critical to and natural for all children regardless of race, culture, or level of income. Another basic underlying principle is that all parents and

family members can be important in the development of skills which can help young children develop as natural mathematicians (Stenmark, et al. 1986).

Indeed, NCTM promotes this kind of learning as (1) opportunities for everyone, (2) teaching and constructing knowledge and (3) broadening the curriculum (Mathematics for the Young Child) (Payne, 1990). NCTM thereby embraces (1) the importance of a good mathematics foundation for Hispanics and other minorities, (2) the well-documented evidence that students construct their own mathematical understandings, and (3) the use of children's natural curiosity to provide a richer scope of content.

The preceding ideas offer the reader a glimpse at what a thoughtful teacher can do to support young children's construct of mathematical knowledge. The authors challenge teachers to look to the culture and environment of their students as a rich background upon which to draw and use the prior knowledge the children have to enhance and enrich learning.

Hispanic Children's Book Bibliography

Aardema, V. (1991). Borreguita and the coyote. New York: Alfred A. Knopf, Inc.

Albert, R.E. (1994). Alejandro's gift. San Francisco: Chronicle Books.

Alexander, F. (1993). Mother Goose on the Río Grande. Lincolnwood, IL: Passport Books.

Avalos, C. (1992). Melones, melones, melones. New York: Scholastic Inc.

Delacre, L. (1989). Arroz con leche-popular songs and rhymes. New York: Scholastic Inc.

De la Peña, L. (1989). El armadillo y el leon/Canto del cenzontle.Mexico City: Consejo Nacional de Fomento Educativo.

De Paola, T. (1980). Lady of Guadalupe. New York: Holiday House

Ehlert, L. (1992). Moon rope/Un lazo a la luna. New York: Harcourt Brace Jovanovich, Publishers.

Garcia, A. (1991). The coyote rings the wrong bell. Chicago: Childrens Press.

Garza, C.L. (1990). Family pictures. San Francisco: Children's Book Press.

_____. (1996). In my family. San Francisco: Children's Book Press.

Gonzalez, L.M. (1995). El gallo de bodas. New York: Scholastic Inc.

Griego, M.C., Bucks, B.L., Gilbert, S.S., & Kimball, L.H.(1981). Tortillitas para mamá and other nursery rhymes. New York: Henry Holt & Company.

Guiberson, B.Z. (1991). Cactus hotel. New York: Henry Holt and Company.

Kendall, M.E. (1993). Piñata party. St. Petersburg, FL: Worthington Press.

Levy, J. (1995). The spirit of tío Fernando/El espíritu de tío Fernando. Morton Grove, IL: Albert Whitman & Company.

Mike, J.M. (1993). Opossum and the great firemaker/La zariqüeya y el gran crador de fuego. New York: Troll Associates.

McDermott. G. (1994). Coyote. New York: Harcourt Brace & Company.

Paulsen, G. (1995). La tortillería. New York: Harcourt Brace & Company.

Riehecky, J. (1993). Cinco de mayo. Chicago: Childrens Press.

Soto, G. (1995). Chato's kitchen. New York: G.P. Putnam's Sons.

_____. (1996). The old man and his door. New York: G.P. Putnam's Sons.

_____. (1993). Too many tamales.New York: G.P. Putnam's Sons.

_____. (1992). The skirt. New York: Delacorte Press.

Stevens, J.R. (1993). Carlos and the squash plant/Carlos y la planta de calabaza. Flagstaff,AZ: Northland Publishing Company.

Thomas, J.R. (1994). Lights on the river. New York: Hyperion books for Children.

Torres, E. (1988). The folk healer. Kingsville, TX: Nieves Press.

Torres, L. (1995). El sancocho del sábado. New York: Scholastic Inc.

BIBLIOGRAPHY

Bredekamp, S., & Copple, C. (Eds.). (1997). Developmentally appropriate practice in early childhood programs. (revised ed.). Washington DC: National Association for the Education of Young Children

Charlesworth, R. (1996). Experiences in math for young children. (3rd ed.). Albany, NY: Delmar Publishers.

Charlesworth, R., & Lind, K.K.(1995). Math and science for young children. (2nd ed.).Albany, NY: Delmar Publishers.

Medearis, L.C. (1996). Young Seminoles and natural math. The Journal of Educational Issues of Language Minority Students, 16, 49-56.

Payne, J.N. (Ed.). (1990). Mathematics for the young child. Reston, VA: The National Council of Teachers of Mathematics, Inc.

Sears, N.C., & Medearis, L.C. (1993). Educating teachers for family involvement with young Native Americans. Oklahoma: Project Head Start. (ERIC document Reproduction Service No. ED 367 513)

Stenmark, J.K., Thompson, V., & Cossey, R. (1986). Family math. University of California, Berkeley: Lawrence Hall of Science.